

TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Forensic Chemistry Standard Operating Procedure Manual

Appendix C: Hypergeometric Sampling for Negative Results

APPENDIX C: HYPERGEOMETRIC SAMPLING WITH ONE OR TWO NEGATIVE RESULTS

⚠ If inconsistent results are encountered during the first hypergeometric sampling, it is **highly recommended** to contact the customer on how to proceed **prior** to conducting the additional sampling outlined below.

C.1 Additional Sampling for Inconsistent Units

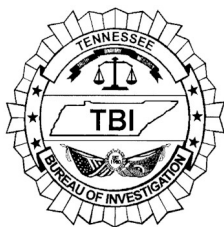
With hypergeometric sampling, negatives are defined as units that do not produce the expected result compared to majority of analyzed units (positives) in the same sampling event.

To use this statistical approach, the analyst must fully analyze all the units that were selected in the first sampling event **regardless of the order in which the negatives were encountered**. The following chart outlines the correct number of additional units to sample based on the number of negatives encountered.

The analyst must meet or exceed the required number of positives out of the sample size in order to make a determination of 90% of the whole at the 95% confidence level.

Total # of units in exhibit	Sampling required for one negative (# of positives / additional sample size)	Sampling required for two negatives (# of positives / additional sample size)
13 - 37	****	****
38 - 59	****	****
60 - 68	30 / 32	****
69 - 73	31 / 33	****
74 - 84	34 / 36	****
85 - 106	38 / 40	****
107 - 126	41 / 43	****
127 - 156	44 / 46	****
157 - 198	47 / 49	****
199 - 222	48 / 50	123 / 133
223 - 246	49 / 51	131 / 142
247 - 259	50 / 52	137 / 148
260 - 287	51 / 53	147 / 159
288 - 324	52 / 54	150 / 162
325 - 372	53 / 55	162 / 175
373 - 392	53 / 55	172 / 186
393 - 465	65 / 68	175 / 189
466 - 590	67 / 70	185 / 200
591 - 770	68 / 71	195 / 201
771 - 940	69 / 72	208 / 224
941 - 1,150	69 / 72	221 / 238
1,151 - 1,500	70 / 73	234 / 252
1,501 - 10,000	72 / 75	245 / 264
10,001 - 30,000	72 / 75	255 / 274
30,000+	73 / 76	256 / 275

**** For these sample sizes, additional units must be analyzed until the total number of positive results obtained for the two samplings equals or surpasses 90% of the units in the exhibit.



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If the analyst does not obtain the required number of positives for the second sampling to be valid, then they must test enough units so that the number of positive results obtained for the two sampling events equals or surpasses 90% of the units in the exhibit. Alternatively, they may choose to utilize weight threshold sample selection.

The analyst cannot use the sample sizes outlined for two negatives in the event of a one negative sampling event failure.

C.2 Examples

❖ Example 1: *One negative unit encountered in first sampling event*

The analyst has an exhibit of 2,000 suspected oxycodone tablets. Since the exhibit will exceed a weight threshold, they randomly select 29 units to analyze. The 15th tablet tested contained alprazolam (negative) instead of the expected oxycodone (positive) found in the previous 14 tablets.

To use this sampling plan, the analyst must complete testing on the remaining 14 units. The analyst determined these 14 units all contained oxycodone.

Since one negative was detected, the analyst will randomly select an additional 75 units and must detect at least 72 positives within those units. The analyst obtains the required number of positives and can report the full weight of the tablets using the hypergeometric sampling remark.

❖ Example 2: *Two negative units encountered in first sampling event*

Using the previous scenario, the analyst detects alprazolam in the 15th and 23rd units. After completing the remaining analyses for the first sampling, they must randomly select 264 units and have at least 245 positive units present in order to report the full weight.

❖ Example 3: *Failure to detect the minimum required positives for second sampling event*

If the analyst could not detect the minimum of 72 positives demonstrated in Example 1, they would then be required to continue sampling units until the total number of positives would reach or exceed 1,800 units using this sampling plan. The total number of positive units would be reported, and the number of negative units would be made into a separate exhibit.

If the analyst decides to use weight threshold sample selection, the total weight of all the positives would be reported with the remainder being included in the appropriate remark. Any negative units encountered would be reported as a separate exhibit.

C.3 Reference

Drug Enforcement Administration Sampling Plan. 2016.